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Memorandum

To: John McGuiggin / Jim Christiansen

From: Tim Wall

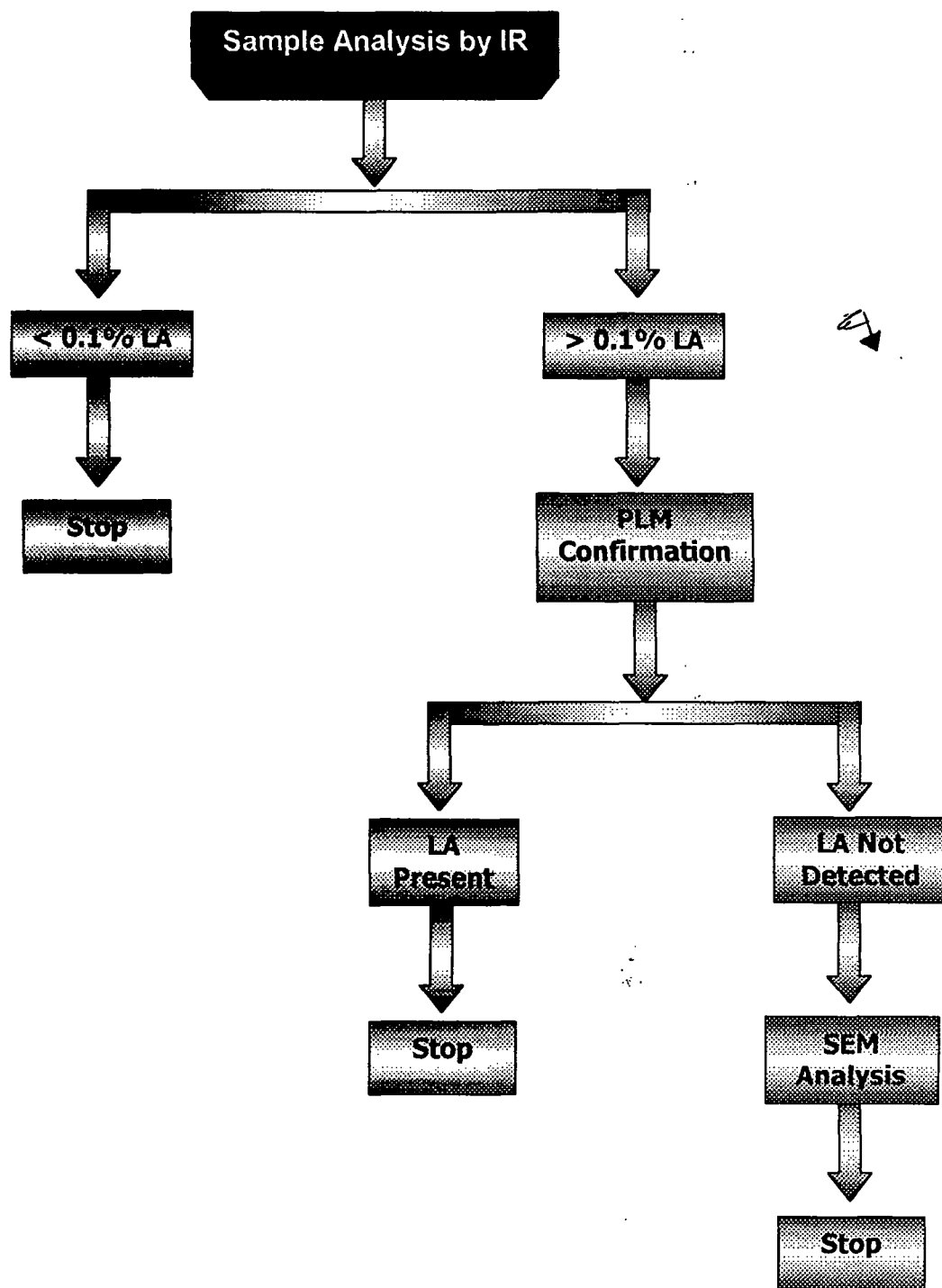
Date: May 22, 2002

Subject: IR Cost & Schedule Evaluation

CDM has read EMSL's protocol to perform asbestos analysis for Libby amphibole (LA) by Reflectance Infrared Spectroscopy (IR). Based on our understanding and further clarification provided by EMSL, the following is an estimate of cost and schedule. To calculate the estimate assumptions were made regarding the proportion of samples that would require differing analysis based on the IR protocol. CDM based these proportions on the actual results from 1,619 characterization soil samples were collected from 364 residences in Libby, MT. Of the 1,619 characterization soil samples, the proportions are as follows: 3% detected Tremolite >1%, 38% detected Tremolite <1% (trace), 59% detected Tremolite as non detect at 1%.

The following information and process flow were provided by EMSL about the IR protocol:

The intent of the PLM analysis in the IR SOP was strictly confirmatory for the presence or absence of asbestos minerals. If the IR detects Libby Amphibole (LA) at concentrations at or above 0.1%, then this result needs to be confirmed. It is required to rule out any mineral interference that may render "false positives" by the IR. An optical method such as PLM or SEM needs to be utilized in conjunction with the IR to differentiate this. Our intent is to not perform a full PLM analysis with an estimated concentration. We believe this will make the data interpretation more difficult. It has been shown that PLM percent estimates are not accurate. If the PLM analysis cannot detect Libby Amphibole subsequent to a >0.1% by IR, then EMSL Analytical, Inc. recommends that the sample be analyzed by Scanning Electron Microscopy (SEM) for further investigation. Please refer to the flowchart below for the decision logic.



COST

Since the IR is not an independent method and subsequent confirmation analysis is required to rule out "false positives" the cumulative raw cost and schedule impacts are detailed below. Raw cost does not including handling, G&A, procurement, quality control, etc.

Assumption: ^{25%}~~15%~~ of the IR results for the 15,000 samples are ND (<0.1% by IR)

Analysis	Sample Quantity	Unit Rate	Cost
IR	15,000	\$50*	\$750,000
<i>80 %** of samples have concentrations > 0.1% = 12,000 samples</i>			
PLM	12,000	\$0	\$0
<i>60%*** of samples by PLM will not be able to detect Libby Amphibole = 7,200 samples</i>			
SEM	7,200	\$125	\$900,000
TOTAL			\$1,650,000

Notes:

- * Estimated unit rate. No procurement or contract has been completed.
- ** CDM estimate. No empirical data available.
- *** Estimate based on proportion of NDs by PLM detected in past residential samples.

The average sample cost for the 15,000 soil samples, based on the above analysis and assumption, is \$110.00 per sample.

SCHEDULE**Assumptions:**

- | | |
|--|-----------------------------------|
| 1. 6 sampling teams | 6 teams/day |
| 2. 5 properties / day / team | 30 properties/day |
| 3. 3,000 properties to sample | |
| 4. 5 samples / property | 150 samples/day or 900 samples/wk |
| 5. 100 days of sampling = 17 weeks @ 6 days/week | |
| 6. 15,000 samples | |

Sample Flow = Libby ➡ Denver-Processing ➡ EMSL

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IR Lab Capacity 500 samples/week

CDM Sample Production 900 samples/week

Demand is 180% of capacity

15,000 samples = 30 weeks for IR analysis

SEM Lab Capacity 150 samples/week

CDM Sample Production 430 samples/week

Demand, assuming no IR backlog, is 287% of capacity

Given IR capacity constraints and the production rate of 500 samples/week, 240 samples/week will need to be analyzed by SEM, given the assumptions detailed above. At 240 samples/week, SEM demand exceeds 160% of capacity.

Thus to analyze 7,200 samples by SEM = 48 weeks (not including backlog created by IR capacity limitation)

The purpose of this memo is not to make a recommendation but to provide the information necessary to start a dialogue regarding the assumptions, cost, and schedule impacts so that a collaborative recommendation can be developed.

cc: Autio
Babin
Montera